

SPECIFICATION

TO ALL WHOM IT MAY CONCERN:

BE IT KNOWN THAT WE, Hisashi Ohki, a citizen of Japan residing at Kawasaki, Japan, Katsunori Masamune, a citizen of Japan residing at Kawasaki, Japan, Masafumi Okumura, a citizen of Japan residing at Kawasaki, Japan, Masato Ageta, a citizen of Japan residing at Kawasaki, Japan, Kazuhiro Takeda, a citizen of Japan residing at Kawasaki, Japan, Keigo Matsunaga, a citizen of Japan residing at Kawasaki, Japan and Takashi Suda, a citizen of Japan residing at Kawasaki, Japan have invented certain new and useful improvements in

STATUS DISPLAY CONTROL UNIT,
ELECTRONIC EQUIPMENT AND STORAGE MEDIUM

of which the following is a specification : -

TITLE OF THE INVENTION

STATUS DISPLAY CONTROL UNIT, ELECTRONIC
EQUIPMENT AND STORAGE MEDIUM

5 BACKGROUND OF THE INVENTION

This application claims the benefit of a Japanese Patent Application No.2001-102172 filed March 30, 2001, in the Japanese Patent Office, the disclosure of which is hereby incorporated by
10 reference.

1. Field of the Invention

The present invention generally relates to status display control units, electronic equipments and storage media, and more particularly to a status
15 display control unit for controlling a display of status information of an electronic equipment, an electronic equipment which is provided with such a status display control unit, and a computer-readable storage medium which stores a program for causing a
20 computer to make display the status information.

In this specification, an electronic equipment includes portable information processing apparatuses such as lap-top personal computers and notebook type word processors, and various kinds of
25 intelligent equipments provided with various functions such as functions for transmitting and/or receiving electronic mail.

2. Description of the Related Art

In some the portable electronic equipments
30 such as the lap-top personal computer, an auxiliary display section is provided in addition to a normal main display section. The auxiliary display section displays status information of the electronic equipment using lamps and symbols such as marks and
35 icons. A display area of the auxiliary display section is small compared to that of the main display section. This is because, if the auxiliary

display section were made large, it would become impossible to provide essential elements on the electronic equipment, such as a keyboard, switches and buttons, terminals and speakers.

5 Accordingly, due to the small size of the auxiliary display section, only a small number of status information of the electronic equipment can be displayed in the auxiliary display section. For this reason, the status information displayed in the
10 auxiliary display section of the conventional electronic equipment is limited to the track number of the compact disk (CD) which is being played, the present time, the remaining capacity of the battery, the received electronic mail or the like. In other
15 words, the status information displayed in the auxiliary display section is extremely limited.

 Examples of the conventional electronic equipment provided with the auxiliary display section described above may be found, for example,
20 in Japanese Laid-Open Patent Applications No.6-43966, No.9-26832 and No.11-119875, and lap-top personal computer model PC-FJ100 series manufactured by Sharp Corporation of Japan.

 In the conventional electronic equipment
25 having the auxiliary display section with the limited display area, there was a problem in that the number of status information of the electronic equipment that can be displayed is limited and detailed status information of the electronic
30 equipment cannot be displayed, because the status information is displayed using lamps, marks and icons.

 Accordingly, an electronic equipment, such as the model FMV-BIBLO NE Series lap-top personal
35 computer manufactured by Fujitsu Limited of Japan, has been proposed in which status information to be displayed on the auxiliary display section is

switched depending on manipulation of a plurality of buttons or switches. FIG. 1 is a perspective view showing this proposed electronic equipment in a state where a lid member is closed. An electronic equipment shown in FIG. 1 generally includes a main body 1 and a lid member 103. An auxiliary display section 105, a mode select switch 106 and an application button group 107 made up of a plurality of application buttons, are provided in a front panel 104 which is exposed even in the state where the lid member 103 is closed. The status information displayed in the auxiliary display section 105 is switched depending on the manipulation of the mode select switch 106 and the application buttons of the application button group 107, so that the limited display area of the auxiliary display section 105 can be utilized efficiently.

However, when the mode select switch 106 and the application buttons of the application button group 105 are arranged side by side on the front panel 104, the display area of the auxiliary display section 105 cannot be made large, because of the need to secure sufficient space especially to arrange the application buttons. As a result, there was a problem in that it is difficult to increase the status information to be displayed on the auxiliary display section 105.

In addition, the operation content of each application button of the application button group 107 changes depending on the operation mode which is determined by the manipulation of the mode select switch 106. However, the operation contents of the application buttons depending on the operation mode are only indicated by a symbol or the like at a portion of the front panel 104 under the application buttons, for example. For this reason, if the user

is not familiar with the operation of the electronic equipment, it is difficult for the user to understand which application button is to be manipulated in order to select a desired operation content, and there was a problem in that the operation efficiency of the electronic equipment becomes poor unless the user is skilled, that is, familiar with the operation of the electronic equipment.

10

SUMMARY OF THE INVENTION

Accordingly, it is a general object of the present invention to provide a novel and useful status display control unit, electronic equipment and storage medium, in which the problem described above is eliminated.

Another and more specific object of the present invention is to provide a status display control unit, electronic equipment and storage medium, which can increase status information which can be displayed in an auxiliary display section, and can improve the manipulation ease of buttons or switches.

Still another object of the present invention is to provide an electronic equipment comprising a main display section, an auxiliary display section which displays status information of the electronic equipment, a plurality of buttons provided above and/or below the auxiliary display section, and a controller which displays definitions or meanings of the plurality of buttons, within the auxiliary display section at positions corresponding to each of the plurality of buttons, depending on an operation mode of the electronic equipment.

According to the electronic equipment of the present invention, it is possible to increase the status information which can be displayed in the auxiliary

display section, and to improve the manipulation ease of the buttons (or switches).

A further object of the present invention is to provide a status display control apparatus for
5 displaying status information of an electronic equipment which includes a main display section, an auxiliary display section, and a plurality of buttons provided above and/or below the auxiliary display section, comprising a controller which
10 displays the status information in the auxiliary display section, and displays definitions or meanings of the plurality of buttons within the auxiliary display section at positions corresponding to each of the plurality of buttons depending on an operation mode of the electronic equipment.
15 According to the status display control apparatus of the present invention, it is possible to increase the status information which can be displayed in the auxiliary display section, and to improve the
20 manipulation ease of buttons (or switches).

Another object of the present invention is to provide a computer-readable storage medium which stores a program for causing a computer to display status information of an electronic equipment which
25 includes a main display section, an auxiliary display section, and a plurality of buttons provided above and/or below the auxiliary display section, where the program comprises a control procedure which causes the computer to display the status
30 information in the auxiliary display section, and to display definitions or meanings of the plurality of buttons within the auxiliary display section at positions corresponding to each of the plurality of buttons depending on an operation mode of the
35 electronic equipment. According to the computer-readable storage medium of the present invention, it is possible to increase the status information which

can be displayed in the auxiliary display section, and to improve the manipulation ease of buttons or switches.

Other objects and further features of the present invention will be apparent from the following detailed description when read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

10 FIG. 1 is a perspective view showing a proposed electronic equipment in a state where a lid member is closed;

FIG. 2 is a perspective view showing an embodiment of an electronic equipment in a state where a lid member is closed;

15 FIG. 3 is a perspective view showing the embodiment of the electronic equipment in a state where the lid member is open;

FIG. 4 is a diagram showing a basic structure of an auxiliary display section;

20 FIG. 5 is a diagram showing a more detailed structure of the auxiliary display section together with a mode select switch and an application button group;

25 FIG. 6 is a system block diagram showing a hardware construction of the embodiment of the electronic equipment;

FIG. 7 is a diagram for explaining a process of a power supply MPU for detecting a knob position;

30 FIG. 8 is a system block diagram showing the auxiliary display section and interfaces;

FIG. 9 is a diagram showing software and hardware structures of an information processing apparatus;

35 FIG. 10 is a diagram showing a corresponding relationship of an operation mode, a

status, and a code which is input to the power supply MPU by manipulation of each application button;

FIG. 11 is a diagram showing a
5 corresponding relationship of an instruction recognized by the power supply MPU and the code output from each application button, within a display content which is displayed in an application button definition display part depending on the
10 operation mode;

FIG. 12 is a flow chart for explaining an operation mode and display determination process;

FIG. 13 is a flow chart for explaining the operation mode and display determination process;
15 FIG. 14 is a flow chart for explaining the operation mode and display determination process;

FIG. 15 is a flow chart for explaining the operation mode and display determination process;

FIG. 16 is a diagram showing a message
20 display in a one-touch mode;

FIG. 17 is a diagram showing a clock display in the one-touch mode;

FIG. 18 is a diagram showing a wall paper display in the one-touch mode;

25 FIG. 19 is a diagram showing a reproducing display in a DISC mode;

FIG. 20 is a diagram showing a pause display in the DISC mode;

FIG. 21 is a diagram showing a stop
30 display in the DISC mode;

FIG. 22 is a diagram showing a display during other application control of the DISC mode, when CD application is not started and when CD is not inserted;

35 FIG. 23 is a diagram showing a news display in a news mode;

FIG. 24 is a diagram showing a processing

display in the one-touch mode or a mail mode;

FIG. 25 is a diagram showing a mail arrived display in the one-touch mode or the mail mode;

5 FIG. 26 is a diagram showing a mail title display in the one-touch mode or the mail mode;

FIG. 27 is a diagram showing an error display in the one-touch mode or the mail mode;

FIG. 28 is a diagram showing a password input display in the one-touch mode or the mail mode;

FIG. 29 is a diagram showing a charge display in the one-touch mode;

FIG. 30 is a diagram showing a charge alarm display in the one-touch mode;

FIG. 31 is a diagram showing a timer display in the one-touch mode;

FIG. 32 is a flow chart for explaining an operation when turning ON the power of the information processing apparatus;

FIG. 33 is a flow chart for explaining a process shown in FIG. 32 in more detail;

FIGS. 34A and 34B are diagrams showing information displayed during a BIOS process;

FIG. 35 is a diagram showing a tray menu screen;

FIG. 36 is a diagram showing a message board setting screen;

FIG. 37 is a diagram showing a timer setting screen;

FIG. 38 is a diagram showing a message setting screen;

FIG. 39 is a flow chart for explaining an operation dependent on various events;

FIG. 40 is a flow chart for explaining a process shown in FIG. 39 in more detail;

FIGS. 41A through 41L are diagrams showing

various display information depending on the operation; and

FIG. 42 is a flow chart for explaining the operation dependent on the various events.

5

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Various embodiments of a status display control unit, an electronic equipment and a computer-readable storage medium according to the present invention will be described with reference to the drawings.

FIG. 2 is a perspective view showing an embodiment of the electronic equipment in a state where a lid member is closed. In addition, FIG. 3 is a perspective view showing the embodiment of the electronic equipment in a state where the lid member is open. This embodiment of the electronic equipment employs an embodiment of the status display control unit according to the present invention. In this embodiment of the electronic equipment, the present invention is applied to a portable information processing apparatus.

As shown in FIGS. 2 and 3, the portable information processing apparatus generally includes a main body 1, and a lid member 3 which is capable of opening and closing with respect to the main body 1, via a hinge part 2. The main body 1 includes a front panel 4 which is exposed even in the state where the lid member 3 is closed. An auxiliary display section 5, a mode select button 6, an application button group 7, and a mode lock switch 9 are provided in this front panel 4. The mode select button 6 is manipulated when selecting an operation mode. The mode lock switch 9 is manipulated when locking the operation mode.

The auxiliary display section 5 has a shape which is elongated in the horizontal direction.

The mode select button 6 is provided below in the left half of the auxiliary display section 5, and the application button group 7 is provided below the right half of the auxiliary display section 5. The mode select button 6 and the application button group 7 may be disposed at arbitrary positions below the auxiliary display section 5 as long as the mode select button 6 and the application button group 7 do not interfere with each other. In addition, the mode select button 6 and the application button group 7 may be disposed at arbitrary positions above the auxiliary display section 5 as long as the mode select button 6 and the application button group 7 do not interfere with each other. Furthermore, it is of course possible to dispose one of the mode select button 6 and the application button group 7 at an arbitrary position above the auxiliary display section 5 and to arrange the other below the auxiliary display section 5.

In addition, a cursor moving mechanism 11, a keyboard 12 and an auxiliary display section 13 are provided on the main body 1, as shown in FIG. 3. A main display section 15 is provided on the lid member 3. The main display section 15 is provided at a position which is visible in the state where the lid member 3 is open.

In this embodiment, the auxiliary display section 13 is provided at a position in a vicinity of the hinge part 2, and the auxiliary display section 13 is not visible when the lid member 3 is closed. However, the location of the auxiliary display section 13 is not limited to the position shown in FIG. 3. The auxiliary display section 13 may be provided at an arbitrary position on the main body 1 or, at an arbitrary position on the lid member 3 such as on a top surface of the lid member 3 on the opposite side of the main display section

15. Furthermore, the auxiliary display section 13 may be omitted.

The display of the status information of the information processing apparatus may be made using at least one of the auxiliary display sections 5 and 13. In this embodiment, it is assumed for the sake of convenience that the status information is displayed using the auxiliary display section 5. In addition, it is assumed for the sake of convenience that the auxiliary display sections 5 and 13 basically have the same construction. Hence, a description will only be given with respect to the construction and display contents of the auxiliary display section 5, and a description of the construction and display contents of the auxiliary display section 13 will be omitted. Of course, the auxiliary display sections 5 and 13 may have mutually different constructions.

A display made in the auxiliary display section 5 is easily recognizable by the user, even in a state where the lid member 3 is closed. Accordingly, the user can recognize various status information from the display made in the auxiliary display section 5 when the lid member 3 is closed, such as during a standby state of the information processing apparatus and when the information processing apparatus is temporarily not used and the user has closed the lid member 3. Even in a state where the main display section 15 is not used, it is desirable that the auxiliary display section 5 is always visible. Therefore, it is not essential to provide both the auxiliary display sections 5 and 13 as shown in FIG. 3, and for the purposes described above, it is sufficient to provide only the auxiliary display section 5 on the information processing apparatus.

In order to make the auxiliary display

section 5 visible to the user even when the main display section 15 is not used, such as when the lid member 3 is closed, it is possible to employ the structure of a sub display section of an information processing apparatus proposed in a Japanese Laid-Open Patent Application No.11-119875 for the auxiliary display section 5. According to the proposed information processing apparatus, a main body and a lid member which has a main display section are connected via a hinge part, and the sub display section is provided in the hinge part, as shown in Fig. 1 of the Japanese Laid-Open Patent Application No.11-119875. A cutout corresponding to the sub display section is provided in the lid member, so that the sub display section is exposed in both the open and closed states of the lid member. By employing the structure of this sub display section for the auxiliary display section 5 of this embodiment, it becomes possible for the user to recognize various status information from the display made in the auxiliary display section 5 when the lid member 3 is closed, such as during the standby state of the information processing apparatus and when the information processing apparatus is temporarily not used and the user has closed the lid member 3.

Of course, the number of auxiliary display sections provided on the information processing apparatus is not limited to that of this embodiment, and it is possible to provide only one auxiliary display section or to provide more than two auxiliary display sections, if necessary.

FIG. 4 is a diagram showing a basic structure of the auxiliary display section 5. As shown in FIG. 4, the auxiliary display section 5 includes a segment display part 21, an application button definition display part 22, a device status

display part 23, a character display part 24, and a battery status display part 25. Characters displayed on the character display part 24 include alphanumeric characters and symbols. Of course, the positions of the display parts 21 through 25 within the auxiliary display section 5 are not limited to the positions shown in FIG. 4.

The character display part 24 has a display area capable of displaying a character string, and is used to display the status information and the like of the information processing apparatus. For example, the character display part 24 may display as it is a message sent from an application layer of a higher level, and the display contents on the character display part 24 is not limited to specific contents. In addition, the characters displayed in the character display part 24 may scroll. Furthermore, a back light having a known construction is provided in the character display part 24, and the display using a liquid crystal display (LCD) may be made in a plurality of colors or made to blink, using the back light. Of course, the display using the LCD may be made in color or made to blink, by itself.

For example, the character display part 24 may indicate the operation state and the like of a CD player (not shown) which has a known construction and is provided within the information processing apparatus. For example, the character display part 24 may display the track number of the music piece which is presently being played on the CD player and the like. Of course, instead of indicating the operation state and the like of the CD player, it is possible to indicate the operation state and the like of an apparatus (apparatus adapted to record and/or reproduce information with respect to a portable recording medium) which uses a portable

recording medium other than the CD, such as a digital versatile disk (DVD). Furthermore, the character display part 24 may indicate the operation mode, the function or the like selected by the mode select button 9, by displaying, for example, a one-touch mode, a disk (CD player) mode, a distribution mode or the like.

The device status display section 23 displays the status of hardware devices, such as the sleep state of the information processing apparatus, the status of the PCMCIA card, the status of the hard disk drive (HDD), the status of the CD, the status of the keyboard 12, and the volume of the hardware device such as the CD player.

The battery status display part 25 displays the remaining capacity of a battery (not shown) which is used by the information processing apparatus, a charged state of the battery and the like. The battery status display part 25 also displays the definition or meaning of the mode select button 6 at a position corresponding to the mode select button 6. In this embodiment, "MODE" is displayed in the battery status display part 25 at the position corresponding to the mode select button 6.

The application button definition display part 22 displays the definition or meaning of each of the application buttons depending on the selected operation mode, at positions corresponding to each of the application buttons of the application button group 7. In this embodiment, the operation mode can be selected from five operation modes by manipulating the mode select button 6, as will be described later. Hence, a selected one of five kinds of definitions or meanings of each of the application buttons is displayed in the application button definition display part 22.

The segment display part 21 displays segment display information, such as a number having an arbitrary number of digits. The segment display part 21 may be omitted.

5 The switching of the color display or the blinking of the display may also be made in any of the application button definition display part 22, the device status display part 23 and the battery status display part 25, similarly as in the case of
10 the character display part 24.

FIG. 5 is a diagram showing a more detailed structure of the auxiliary display section 5 together with the mode select button 6 and the application button group 7. In FIG. 5, those parts
15 which are the same as those corresponding parts in FIGS. 2 through 4 are designated by the same reference numerals, and a description thereof will be omitted. In FIG. 5, the application button group 7 includes four application buttons 7A through 7D.

20 FIG. 6 is a system block diagram showing a hardware construction of this embodiment of the electronic equipment. The information processing apparatus includes a CPU 31, a software 32 which is executed by the CPU 31, a chip set section 33, a
25 keyboard control (KBC) section 34, an ASIC register 35, a CD controller 36, a CD and/or digital versatile disk (DVD) player (CD/DVD player) 37, a power supply circuit 38, a power supply MPU 39, a hardware volume adjusting knob 40, a segment display
30 interface 41, a character display interface 42, an icon display interface 43, a P-BUS interface 45, a power supply circuit interface 46, a hardware volume interface 47, a high-speed bus 48, a switch group 50, and the auxiliary display section 5 which are
35 connected as shown in FIG. 6.

The CPU 31 controls the entire operation of the information processing apparatus, and

executes the software 32 such as application programs (hereinafter simply referred to as applications). The software 32 itself is stored in an arbitrary recording medium. The chip set section
5 33 sets various parts within the main body 1 depending on instructions from the CPU 31. The ASIC register 35 is provided to store the status information which is to be displayed in the auxiliary display section 5. For example, character
10 display information from the CPU 31, keyboard state information from the KBC section 34, various status signals, CD access signals from the CD/DVD player 37 and the like are stored in the ASIC register 35.

The arbitrary recording medium which
15 stores the software 32 forms an embodiment of a computer-readable storage medium according to the present invention. In other words, the recording medium forming the computer-readable storage medium stores a program for causing a computer, such as the
20 CPU 31 of the information processing apparatus, to control the status display and the like according to this embodiment of the status display control unit. The program causes the computer to display the status information and the like of the information
25 processing apparatus which may be the computer itself. The recording medium forming the computer-readable storage medium may be selected from any kind of recording media capable of storing the program, including semiconductor memory devices such
30 as ROMs and RAMs, magnetic recording media such as magnetic disks, optical recording media such as CD-ROMs, magneto-optical recording media, and memory cards.

The power supply MPU 39 makes access to
35 the ASIC register 35 using the P-BUS interface 45. Based on the accessed information, the power supply MPU 39 supplies character and icon display

information, that is, status information, to the auxiliary display section 5 via the character display interface 42 and the icon display interface 43.

5 The power supply circuit 38 supplies a power supply voltage from the battery of an AC adapter to various parts within the information processing apparatus. The power supply MPU 39 reads power supply information from the power supply
10 circuit 38 via the power supply circuit interface 46, and makes a display in the auxiliary display section 5 after carrying out a calculation process or the like. The power supply information which is subjected to the calculation process of the power
15 supply MPU 39 includes battery information indicating the remaining capacity of the battery, and the like.

 The hardware volume adjusting knob 40 is a dial type knob which supplies a volume resistance
20 dependent on the knob position to the power supply MPU 39 via the hardware volume interface 47. FIG. 7 is a diagram for explaining a process of the power supply MPU 39 for detecting the knob position of the hardware volume adjusting knob 40. In a step S1,
25 the power supply MPU 39 inputs, from the hardware volume adjusting knob 40, the volume resistance which is dependent on the knob position of the hardware volume adjusting knob 40, via the hardware volume interface 47. In a step S2, the power supply
30 MPU 39 subjects the input volume resistance to an analog-to-digital (A/D) conversion. In a step S3, the power supply MPU 39 supplies to the auxiliary display section 5, via the icon display interface 43, icon display information for displaying the knob
35 position in the device status display part 23 of the auxiliary display section 5.

 The high-speed bus 48 connects the ASIC

register 35 and the auxiliary display section 5, and is used mainly for transferring graphic data. On the other hand, the character display interface 42 is used mainly for transferring font data via the power supply MPU 39.

The switch group 50 includes the mode select button 6 and the application buttons of the application button group 7.

Segment display information from the CD controller 36 or the like is supplied to the auxiliary display section 5 via the segment display interface 41.

FIG. 8 is a system block diagram showing the auxiliary display section 5 and the interfaces 41 through 43. The character display part 24 is provided with a back light 24A having an arbitrary structure capable of lighting in a plurality of colors. The display parts 22 and 23 other than the character display part 24 are illustrated as an icon display part 26 in FIG. 8. In addition, the character display interface 42 employs a parallel or serial data transfer technique as in TTL interfaces and CMOS interfaces. For this reason, the auxiliary display section 5 is provided with a LCD driver 27 including an A.C. circuit for driving the character display part 24 which is made of LCD, and a character generator (CG) 28. The character display interface 42 supplies character display information, including the font data, to this character generator 28.

The segment display interface 41 supplies to the segment display part 21 which is made of LCD, segment display information related to a number having an arbitrary number of digits or the like, for directly driving and making the display on the segment display part 21. The icon display interface 43 supplies various icon display information to the

icon display part 26 which is made of LCD, for directly driving and making the display on the icon display part 26.

The illustration of a back light
5 controller 48 is omitted in FIG. 6, but is connected to the auxiliary display section 5 as shown in FIG. 8. Based on the display information from the power supply MPU 39, the back light controller 48 controls the ON/OFF state, the color and the like of the back
10 light 24A of the character display part 24, including the ON state, the OFF state and the blinking interval.

FIG. 9 is a diagram showing the software and hardware structures of the information
15 processing apparatus. In FIG. 9, a software layer SWL includes mail programs 321, CD player applications 322, other applications 323, and a LCD handling software (driver) 324, which correspond to the software 32 shown in FIG. 6. On the other hand,
20 a hardware layer HWL includes the ASIC register 35, the power supply MPU 39, the auxiliary display section 5 and the like. The illustration of other hardware parts of the hardware layer HWL, such as the chip set section 33, is omitted in FIG. 9 since
25 the other hardware parts are shown in FIG. 6.

The mail programs 321 include programs for realizing functions related to the electronic mail, such as transmitting and receiving the electronic mail. The CD player applications 322 include
30 programs for realizing various functions of the CD/DVD player 37. The LCD handling software 324 is provided to make access to the ASIC register 35 when making the display in the auxiliary display section 5. Accordingly, the ASIC register 35 has a role of
35 providing a channel between the LCD handling software 324 and the power supply MPU 39.

The LCD handling software 324 carries out

the following processes (a) through (e).

(a) Writing the display information to be displayed in the auxiliary display section 5 into the ASIC register 35.

5 (b) Controlling the display in the auxiliary display section 5.

(c) Arbitration of messages sent from an application layer of a higher level. In other words, when a plurality of messages are transmitted from a plurality of applications, an arbitration is made to successively display these messages in the auxiliary display section 5 in turns or rotation, for example.

10 (d) Controlling the ON/OFF display mode of the auxiliary display section 5 or the ON/OFF state of the back light 24A.

(e) Controlling the color display mode of the auxiliary display section 5 or the color of the back light 24A.

Next, a description will be given of the definitions of the operation modes, the statuses and the application buttons in this embodiment, by referring to FIGS. 10 through 15.

FIG. 10 is a diagram showing a corresponding relationship of an operation mode, a status, and a code which is input to the power supply MPU 39 from the switch group 50 shown in FIG. 6 by manipulation of each of the application buttons 7A through 7D of the application button group 7. As shown in FIG. 10, the operation modes include a one-touch mode, a password input mode, a mail mode, a disk (DISC) mode, and a news mode.

For example, in the case of the one-touch mode, the application button 7A is manipulated when selecting the Web which utilizes the Internet, and a code "10" is output. The application button 7B is manipulated when selecting the electronic mail (E-mail), and a code "11" is output. The application

button 7C is manipulated when selecting the application "A", and a code "12" is output. In addition, the application button 7D is manipulated when selecting the application "B", and a code "13" is output.

The mail mode includes a mail title display status and a processing status. The DISC mode includes a reproducing status, pause (temporary stop) status, a top status and other (CD non-insertion) status.

FIG. 11 is a diagram showing a corresponding relationship of an instruction recognized by the power supply MPU 39 and the code output from each of the application buttons 7A through 7D of the application button group 7, within a display content which is displayed in the application button definition display part 22 depending on the operation mode. The power supply MPU 39 recognizes the instruction input from the application button group 7 based on the corresponding relationship table shown in FIG. 11. For the sake of convenience, FIG. 11 shows the corresponding relationship table as storing the actual display contents which are to be displayed in the application button definition display part 22, but of course, the corresponding relationship table actually stores data or codes indicating such display contents. In addition, in FIG. 11, "space" indicates a state where no display is made in the application button definition display part 22, and "x" indicates that the code is unused.

As will be described later, a message display shown in FIG. 16, a clock display shown in FIG. 17, a wall paper display shown in FIG. 18, a processing display shown in FIG. 24, a mail arrival display shown in FIG. 25, a mail title display shown in FIG. 26, an error display shown in FIG. 27, a

password input display shown in FIG. 28, a charge display shown in FIG. 29, a charge alarm display shown in FIG. 30, a timer display shown in FIG. 31 and the like are made in the one-touch mode.

5 As will be described later, the password input display shown in FIG. 28 is made in the password input mode.

As will be described later, the processing display shown in FIG. 24, the mail arrival display
10 shown in FIG. 25, the mail title display shown in FIG. 26, the error display shown in FIG. 27, the password input display shown in FIG. 28 and the like are made in the mail mode.

As will be described later, the reproducing display shown in FIG. 19, a pause display shown in FIG. 20, a stop display shown in
15 FIG. 21, an other application control display, when CD application is not started and when CD is not inserted shown in FIG. 22, and the like are made in
20 the DISC mode.

A news display shown in FIG. 23 and the like are made in the news mode. In the news mode, the information processing apparatus displays the news, weather forecast, traffic information and the
25 like by a known method based on data obtained via a network such as the Internet, a communication line such as a telephone line, and character multiplexed broadcasting.

In order to make the drawings more easy to understand, the illustration of the reference numerals for the parts which are the same as those corresponding parts in FIG. 5 is omitted in FIGS. 16 through 31.

FIGS. 12 through 16 respectively are flow charts for explaining an operation mode and display determination process. The operation mode and display determination process shown in FIGS. 12
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through 16 are carried out by the power supply MPU 39.

FIG. 12 is a flow chart for explaining the process when the initial state is set to the one-touch mode. In FIG. 12, when the power supply of the information processing apparatus is turned ON, a step S201-1 sets the operation mode to the one-touch mode, and a step S202-1 makes the display in the one-touch mode on the auxiliary display section 5 as shown in any of FIGS. 16 through 18 and 24 through 30. A step S203-1 decides whether or not a change occurred in the status. If the decision result in the step S203-1 is YES, a step S204-1 changes the display on the auxiliary display section 5 depending on the change in the status, and the process returns to the step S203-1. On the other hand, if the decision result in the step S203-1 is NO, a step S205-1 decides whether or not the mode select button 6 is pushed. The process returns to the step S203-1 if the decision result in the step S205-1 is NO. If the decision result in the step S205-1 is YES, a step S206-1 makes the menu display shown in FIG. 5 on the auxiliary display section 5, and the process advances to a step S207 shown in FIG. 15 which will be described later. FIG. 5 shows a state where the cursor is positioned to the one-touch mode which is displayed conspicuously, of the one-touch mode, the DISC mode and the news mode (distribution mode), to indicate that the one-touch mode is selectable.

FIG. 13 is a flow chart for explaining the process when the initial state is set to the DISC mode. In FIG. 13, when the power supply of the information processing apparatus is turned ON, a step S201-2 sets the operation mode to the DISC mode, and a step S202-2 makes the display in the DISC mode on the auxiliary display section 5 as shown in any of FIGS. 19 through 22. A step S203-2 decides

whether or not a change occurred in the status. If the decision result in the step S203-2 is YES, a step S204-2 changes the display on the auxiliary display section 5 depending on the change in the status, and the process returns to the step S203-2. On the other hand, if the decision result in the step S203-2 is NO, a step S205-2 decides whether or not the mode select button 6 is pushed. The process returns to the step S203-2 if the decision result in the step S205-2 is NO. If the decision result in the step S205-2 is YES, a step S206-2 makes a menu display similar to that shown in FIG. 5 on the auxiliary display section 5, and the process advances to a step S207 shown in FIG. 15 which will be described later. In this case, however, the cursor is positioned to the DISC mode which is displayed conspicuously, of the one-touch mode, the DISC mode and the news mode (distribution mode), to indicate that the DISC mode is selectable.

FIG. 14 is a flow chart for explaining the process when the initial state is set to the news mode (distribution mode). In FIG. 14, when the power supply of the information processing apparatus is turned ON, a step S201-3 sets the operation mode to the news mode, and a step S202-3 makes the display in the news mode on the auxiliary display section 5 as shown in FIG. 23, for example. A step S203-3 decides whether or not a change occurred in the status. If the decision result in the step S203-3 is YES, a step S204-3 changes the display on the auxiliary display section 5 depending on the change in the status, and the process returns to the step S203-3. On the other hand, if the decision result in the step S203-3 is NO, a step S205-3 decides whether or not the mode select button 6 is pushed. The process returns to the step S203-3 if the decision result in the step S205-3 is NO. If

the decision result in the step S205-3 is YES, a step S206-3 makes a menu display similar to that shown in FIG. 5 on the auxiliary display section 5, and the process advances to a step S207 shown in FIG. 15 which will be described later. In this case, however, the cursor is positioned to the news mode (distribution mode) which is displayed conspicuously, of the one-touch mode, the DISC mode and the news mode, to indicate that the news mode is selectable.

10 In FIG. 15, the step S207 decides whether or not the mode select button 6 is pushed. If the decision result in the step S207 is YES, a step S208 switches the operation mode to the next operation mode, and a step S209 shifts the cursor position in
15 FIG. 5. In this embodiment, the operation mode is switched in the order of the one-touch mode ---> the DISC mode ---> the news mode (distribution mode) ---> the one-touch mode, ..., every time the mode select button 6 is manipulated (pushed), and the
20 cursor position is switched and shifted accordingly. After the step S209 or, if the decision result in the step S207 is NO, a step S211 decides whether or not a predetermined time of one second, for example, has elapsed from the time when the mode select
25 button 6 is pushed. The process returns to the step S207 if the decision result in the step S211 is NO.

If the decision result in the step S211 is YES, a step S212 decides whether or not the selected operation mode is the one-touch mode. If the
30 decision result in the step S213 is YES, a step S214 makes the display on the auxiliary display section 5 in the one-touch mode as shown in any of FIGS. 16 through 28 and 24 through 30. On the other hand, if the decision result in the step S213 is NO, a step
35 S215 decides whether or not the selected operation mode is the DISC mode. If the decision result in the step S215 is YES, a step S216 makes the display

on the auxiliary display section 5 in the DISC mode as shown in any of FIGS. 18 through 22. In addition, if the decision result in the step S215 is NO, a step S217 makes the display on the auxiliary display section 5 in the news mode as shown in FIG. 23.

Therefore, as shown in FIGS. 5 and 16 through 31, "MODE" is displayed within the auxiliary display section 5 above the mode select button 6, so that the definition or meaning of the mode select button 6 can easily be understood by the user. In addition, as shown in FIGS. 16 through 31, the definitions or meanings of each of the application buttons 7A through 7D depending on the operation mode are displayed within the auxiliary display section 5 above each of the application buttons 7A through 7D of the application button group 7. For this reason, even an unskilled user or a user who is not familiar with the operation of the information processing apparatus can easily understand the definitions or meanings of each of the application buttons 7A through 7D. Furthermore, since the application buttons 7A through 7D are provided below the auxiliary display section 5, it is possible to make the display area of the auxiliary display section 5 along the longitudinal direction larger compared to the conventional case shown in FIG. 1, for example, thereby making it possible to increase the status information which can be displayed in the auxiliary display section 5.

When a password input mode is instructed by the CPU 31 of the information processing apparatus while carrying out the processes shown in FIGS. 12 through 15, the power supply MPU 39 makes a password input display shown in FIG. 28 on the auxiliary display section 5 in response to an interrupt from the CPU 31. Similarly, when an important electronic mail or an electronic mail from

a specific sender is received as will be described later, for example, and a mail mode is instructed by the CPU 31 of the information processing apparatus, the power supply MPU 39 makes a display shown in any
5 of FIGS. 24 through 28 on the auxiliary display section 5 in response to an interrupt from the CPU 31.

Next, a description will be given of the operation of this embodiment of the electronic equipment as a whole, by referring to FIGS. 32 through 42. FIG. 32 is a flow chart for explaining an operation when turning ON the power of the information processing apparatus. FIG. 33 is a flow chart for explaining a process shown in FIG. 32 in
10 more detail. FIGS. 34A and 34B are diagrams showing information displayed during a BIOS process. FIGS. 35 through 38 respectively are diagrams for explaining setting screens. FIG. 39 is a flow chart for explaining an operation dependent on various
15 events. FIG. 40 is a flow chart for explaining a process shown in FIG. 39 in more detail. FIGS. 41A through 41L are diagrams showing various display information depending on the operation. Further, FIG. 42 is a flow chart for explaining the operation
20 dependent on the various events. In FIGS. 32, 39 and 42, steps indicated by boxes with a double solid line are basically carried out by the LCD handling software 324 described above.

In FIG. 32, when the power of the
30 information processing apparatus is turned ON in a step S11, a step S12 carries out the BIOS process. As a result, model information related to a model name and the like of the information processing apparatus is displayed in the character display part
35 24 of the auxiliary display section 5. FIGS. 34A and 34B show examples of the model information which is displayed in the character display part 24.

After the step S12, a step S13 starts an operating system (OS), and the process advances to a step S14 for setting the display contents of the auxiliary displays section 5. The step S14 includes steps S15
5 through S23.

The step S15 decides whether or not the present time is between 5:00 and 11:00. If the decision result in the step S15 is YES, the step S19 displays a greeting "GOOD MORNING" in the character
10 display part 24 of the auxiliary display section 5, and the process advances to the step S20. On the other hand, if the decision result in the step S15 is NO, the step S16 decides whether or not the present time is between 11:00 and 18:00. If the
15 decision result in the step S16 is YES, the step S17 displays a greeting "GOOD AFTERNOON" in the character display part 24, and the process advances to the step S20. If the decision result in the step S16 is NO, the step S18 displays a greeting "GOOD
20 EVENING" in the character display part 24, and the process advances to the step S20. The greeting message displayed in the character display part 24 may scroll. The step S20 displays the present time in the character display part 24 of the auxiliary
25 display section 5.

After the step S20, the step S21 sets messages which are related to the CD player, the electronic mail and the password and are to be displayed in the character display part 24. The
30 setting of the messages made in the step S21 may be related to the setting the important or specific electronic mail, setting the display of sender or subject name (title), setting the display of the communication time or communication cost, setting
35 the back light 24A and the like.

The step S22 sets a user message which is to be displayed in the character display part 24.

The setting of the user message made in the step S22 may be related to the setting of the display contents, setting of the display timing, setting of the back light 24A and the like.

5 The step S23 sets linking of applications (PIM, etc.) which are to be displayed in the character display part 24. The setting of the linking of the applications made in the step S23 may be related to the setting linked to a schedule,
10 setting linked to the back light 24A and the like.

 After the step S23, the information processing apparatus carries out an operation by the OS, and processes which will be described with reference to FIGS. 39 and 42 are carried out
15 depending on the generation of various events. In the following description, it is assumed for the sake of convenience that the display contents are displayed in the character display part 24 of the auxiliary display section 5.

20 Next, a more detailed description will be given of a process carried out in the step S14 shown in FIG. 32, by referring to FIG. 33. In FIG. 33, after the step S13 shown in FIG. 32, a step S101 decides whether or not to make a message display,
25 and a step S102 carries out an event-related process if the decision result in the step S101 is YES. A step S103 decides whether or not an event function is set valid, and a step S104 decides whether or not to make a greeting if the decision result in the
30 step S103 is NO. If the decision result in the step S104 is YES, a step S105 displays a greeting, such as the greetings of the steps S17 through S19 shown in FIG. 32 depending on the present time, for example, in the character display part 24 of the
35 auxiliary display section 5, and the process advances to a step S106. The step S106 displays the present time in the character display part 24. In

addition, a step S107 makes a display which is set by the user in the character display part 24 of the auxiliary display section 5. When the user makes the settings in the steps S21 through S23 shown in
5 FIG. 32, the settings are made between the steps S106 and S107. For example, the operating system (OS) operates, and the settings are made to enable use of the applications which operate under the OS.

On the other hand, if the decision result
10 in the step S104 is NO, a step S110 decides whether or not a display of a shut-down time of the information processing apparatus is to be made. If the decision result in the step S110 is YES, a step S111 displays the shut-down time, and the process
15 advances to the step S106. In addition, if the decision result in the step S110 is NO, a step S112 displays a message which is set by the user in the character display part 24 of the auxiliary display section 5, and the process advances to the step S106.

If the decision result in the step S103 is YES, a step S115 decides whether or not an event is generated, and the process advances to the step S104 if the decision result in the step S115 is NO. On
20 the other hand, if the decision result in the step S115 is YES, a step S116 displays the generated event in the character display part 24 of the auxiliary display section 5, and the process
25 advances to the step S106.

Next, a description will be given of the
30 various setting screens which are displayed in the main display section 15 when making the settings in the steps S21 through S23 shown in FIG. 32, by referring to FIGS. 35 through 38. FIG. 35 is a diagram showing a tray menu screen. FIG. 36 is a
35 diagram showing a message board setting screen. FIG. 37 is a diagram showing a timer setting screen. Further, FIG. 38 is a diagram showing a message

specifying screen.

For the sake of convenience, it is assumed that the application used for making the settings related to the processes which use the auxiliary display section 5, the settings related to the contents to be displayed on the auxiliary display section 5 and the like operate under the Windows (registered trademark) operating system (OS). In this case, when the information processing apparatus is started, an icon indicating this application is displayed in a task tray, and the tray menu screen shown in FIG. 35 is displayed when the user selects this icon in order to make the settings in the steps S21 through S23.

When the user selects "SETTING" on the tray menu screen, a property setting screen shown in FIG. 36 is displayed. The property setting screen is made up of a plurality of tabs corresponding to the settings, and the user selects the tab corresponding to the setting which is to be changed. In FIG. 36, six tabs are provided, namely, a message board tab, an image tab, a setting tab, a greeting tab, a news tab and a timer tab. FIG. 36 shows a state where the message board tab is selected from the six tabs. The user specifies a message which is to be displayed in the message board tab. In this particular case, a message "OUT FOR LUNCH" is specified.

FIG. 37 shows a state where the timer tab is selected from the six tabs. In this timer tab, the user specifies a time when a notification is to be made, a message which is to be notified, a notifying interval in a case where the notification is to be made periodically, and the like. In this particular case, two kinds of notifications and messages can be specified. In addition, when specifying the message to be notified, the user

selects a message specifying (S) button 500
corresponding to a message (M), for example, and the
message specifying screen shown in FIG. 38 is
displayed. FIG. 38 shows a case where the message
5 (M), a color (C) of the back light of the auxiliary
display section 5, and a display time can be set.
More particularly, FIG. 38 shows a state where the
message (M) is set to "TIME TO GO HOME", the color
(C) of the back light is set to "PURPLE", and the
10 display time is set to "60 SECONDS".

When other tabs are selected, it is
possible to similarly change the corresponding
settings.

Next, a description will be given of the
15 processes which are carried out depending on the
generation of the various events, by referring to
FIG. 39. In FIG. 39, when a CD play event is
generated in a step S31, a step S32 displays a
message shown in FIG. 19 or FIG. 41J to indicate
20 that the CD is being played. In FIG. 41J and FIGS.
41A through 41L, the symbols and animation, other
than the characters, may be used to supplement the
contents of the message which is indicated by the
characters. In the case shown in FIGS. 19 and 41J,
25 the musical notes displayed under the characters
indicate that music is being played by playing the
CD.

When an electronic mail reception event is
generated in a step S41 shown in FIG. 39, a step S42
30 displays a message shown in FIG. 41A to indicate
that a dial-up is in progress. Thereafter,
depending on the result of the dial-up, a step S43
displays a message indicating that the line is busy,
and/or a step S44 displays a message shown in FIG.
35 41D to indicate that a re-dialing is on standby. A
step S45 displays a message shown in FIG. 41B to
indicate that authentication of the connection is

taking place. Depending on the result of the connection authentication, a step S46 displays a message to indicate a generation of an authentication error.

5 A step S47 displays a message shown in FIG. 24 or 41C to indicate that the line is being connected, and a step S48 displays a message shown in FIG. 41E to indicate that the electronic mail is being checked. A step S49 displays a message shown in FIG. 41F to indicate that the electronic mail is
10 being received. A step S50 displays a message shown in FIG. 25 or 41G to indicate that the electronic mail is received. In addition, a step S51 displays a message to indicate the number of received
15 electronic mail.

A step S52 may display a message shown in FIG. 41H to indicate the reception of an important electronic mail. A step S53 may display a message shown in FIG. 41I to indicate that an electronic
20 mail is received from a specific sender AA. On the other hand, a step S54 may display a message shown in FIG. 26 to indicate the reception of an electronic mail from a specific sender, and a step S55 may display a message shown in FIG. 26 to
25 indicate the subject name (title) of received electronic mail.

A step S56 displays a message shown in FIG. 29 indicating the communication time or the communication cost, and a step S57 displays a
30 message shown in FIG. 27 indicating an error if other errors exist.

In a case where a setting has been made by the user to display a specified message by use of the message board tab described above, a step S61
35 displays a message such as that shown in FIG. 16 or 41K.

The display contents of the messages shown

in FIGS. 41A through 41L may scroll, and the ON/OFF state and the color display of the back light 24A may be switched arbitrarily. Furthermore, symbols and/or animation may be displayed together with the display contents of the messages shown in FIGS. 41A through 41J. Particularly when indicating the important electronic mail or the reception of the electronic mail from the specific sender, for example, it is possible to indicate the importance of the display contents of the message by emphasizing the display by the control of the back light 24A. In addition, by displaying the message related to the error or the like using red back lighting or blinking of the back lighting by the control of the back light 24A, it is possible to make the user easily recognize the abnormal state or the like of the information processing apparatus. Moreover, it is of course possible to successively display a plurality of kinds of messages in turns or rotation.

Next, a more detailed description will be given of the processes carried out by the step S50 and the subsequent steps shown in FIG. 39, by referring to FIG. 40. In FIG. 40, after the step S49 shown in FIG. 39, a step S121 reads a registered mail address list which is registered in advance in a main memory (RAM or the like, not shown) or an auxiliary storage unit (hard disk drive or the like, not shown), and a step S122 decides whether or not the mail address of the sender of the electronic mail is included in the registered mail address list. If the decision result in the step S122 is NO, a step S123 decides whether or not an important electronic mail is included in the received electronic mails. For example, it is possible to distinguish the important electronic mail from other electronic mails, using information such as a

specific sender of the electronic mail, a specific title of a priority order of the header of the electronic mail, and the electronic mail having a predetermined marking made thereon.

5 If the decision result in the step S123 is NO, a step S125 sets the symbol/animation and the back light for the normal electronic mail, and the process advances to a step S128 which will be described later. If the decision result in the step
10 S123 is YES, a step S126 sets the symbol/animation and the back light for the important electronic mail, and the process advances to the step S128 which will be described later. In addition, if the decision result in the step S122 is YES, a step S127 sets the
15 symbol/animation and the back light for the electronic mail from the specific sender, and the process advances to the step S128 which will be described later. The steps S125 through S127 form a step S124 which also includes the processes of the
20 steps S50 and S51 shown in FIG. 39.

 The step S128 advances to a next electronic mail if advancing to the next electronic mail is instructed by the pushing of the application button of the application button group 7, for
25 example. A step S129 decides whether or not the electronic mail is the last electronic mail and no next electronic mail exists. The process ends if the decision result in the step S129 is YES. On the other hand, if the decision result in the step S129
30 is NO, a step S130 displays the sender, the title and the like of the next electronic mail, and the process returns to the step S128. Accordingly, the step S130 includes the processes of the steps S53, S55 or the like shown in FIG. 39.

35 If the decision result in the step S129 is YES, it is of course possible to carry out the processes of the steps S56 and S57 shown in FIG. 39

before ending the process.

- Next, a description will be given of the processes carried out depending on the generation of the various events, by referring to FIG. 42. In FIG. 42, at an application linking timing, a step S71 displays an application linking message. For example, a schedule linking display is made at a scheduled time. In other words, it is possible to display contents such as corresponding schedule information which has been set by the user, at a time which is set on the application by the user. Accordingly, a display can be made depending on the time and contents which have been set by the user on a schedule management application or the like.
- In a case where a setting has been made by the user to display a specified message at a specified timing by use of the timer tab described above, the step S71 displays a message such as that shown in FIG. 31 or 41L. In FIG. 41L, only the leaving time (time to go home) and the present date are displayed, but it is of course possible to scroll the display so that such time information and the message "TIME TO GO HOME" are alternately displayed. Further, it is of course possible to display only the message.
- In this case, it is possible to set a message corresponding to a time, within the schedule management application, and to link the auxiliary display section 5 and a program which generates an alarm or the like at the set time. The schedule management application generates an interrupt or the like with respect to the auxiliary display section 5 at the scheduled time, and the auxiliary display section 5 displays the schedule which is set by the schedule management application.
- When a standby transition event is generated in a step S81, a step S82 decides whether or not an electronic mail reservation is made. If

the decision result in the step S82 is YES, a step S83 displays the next electronic mail check time, and the process advances to a step S85. On the other hand, if the decision result in the step S82 is NO, a step S84 displays the standby transition time when the transition is made to the standby state. After the step S83 or S84, the step S85 controls the information processing apparatus to make the transition to the standby state.

When a CD play event which is on standby is generated in a step S86, a step S87 displays a message shown in FIG. 19 or 41J to indicate that the CD is being played.

In addition, after the transition to the standby state or, in a shut-down state, when a wake-up event is generated in a step S88, a step S89 displays a password request. The password request is a message indicating "PLEASE INPUT PASSWORD" as shown in FIG. 28, for example. Furthermore, a step S90 displays the input password. The password may be input by pushing the application buttons of the application button group 7 located on the side of the auxiliary display section 5 a number of times and/or in an order corresponding to the password. Every time the application button is pushed, a symbol "*" or the like is displayed in the auxiliary display section 5. When an error exists in the input password, a step S91 may display a password error. The password error may be indicated by a message such as "PASSWORD IS IN ERROR". When the password is correctly input, the information processing apparatus assumes the wake-up state.

When inputting the password by pushing the application buttons of the application button group 7 the number of times and/or in the order corresponding to the password, this password input operation can easily be made in the state where the

lid member 3 is closed. In addition, the result of the password input operation is displayed in the auxiliary display section 5 which is easily visible by the user in the state where the lid member 3 is closed. Accordingly, the password input operation and the password confirmation operation can be carried out regardless of the position of the lid member 3.

Further, the present invention is not limited to these embodiments, but various variations and modifications may be made without departing from the scope of the present invention.

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